Remarks

Claims 1-16 are pending in the application, and each of the claims was rejected. By this paper, claims 1-16 have been amended, and each is believed to be in allowable form. Consideration of the amended claims is respectfully requested.

A. Specification

A single paragraph on page 17 of the specification is amended. Specifically, the Amendment added a reference to a first set of operating conditions and a second set of operating conditions. No new matter has been added to the specification since each of the operating conditions was fully described in the specification as originally filed. The terms "first set of operating conditions" and "second set of operating conditions" merely act as identifiers that help to correlate the claim language with elements that were already fully described in the specification.

B. Claims

The Examiner rejected claims 1-12 and 14-16 under 35 U.S.C. § 112, first paragraph. The Examiner also rejected claims 1-3 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,109,237 (Pels et al.) in view of U.S. Patent No. 5,081,365 (Field et al.). The Examiner further rejected claims 4-16 under 35 U.S.C. § 103(a) as being unpatentable over Pels et al. in view of Field et al. as applied to claims 1 and 2, and further in view of U.S. Patent No. 6,209,672 (Severinsky), and further in view of U.S. Patent No. 6,351,698 (Kubota et al.). Finally, the Examiner rejected claims 1, 3, 11 and 13-16 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending application No. 09/712,436.

Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claims 1-12 and 14-16 as containing subject matter not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors had possession of the claimed invention at the time the application was filed. In particular, the Examiner stated that the following limitations were not defined in the specification: "a predetermined first set of operating conditions, a predetermined second set of operating conditions, first set of vehicle idle entry, the desired engine brake torque, the first desired effect, [and] a maximum desired level." As discussed above, the specification has been amended to define the terms "a predetermined first set of operating conditions" and "a predetermined second set of operating conditions."

As noted above, these terms merely added an identifier to the sets of operating conditions which were fully defined and described in the specification as originally filed. Thus, it is submitted that the § 112 rejection is overcome with regard to those two limitations.

With regard to the term "vehicle idle entry conditions," the specification on page 9, lines 18-21 provides a full and complete description. In particular, the specification states that "to be in vehicle idle entry conditions, the vehicle speed ('VSPD') must be below a predetermined minimum value ('VSPD_IDLE') and accelerator position ('PPS_REL') must be below a minimum level ('PPS_MIN_IDLE'). It is submitted that this description fully describes the "set of vehicle idle entry conditions," and as such, the § 112 rejection is overcome with regard to this term.

The terms "desired engine brake torque" and "first desired effect," do not appear in the amended claims. Therefore, the § 112 rejection based on these terms is moot. Finally, the term "maximum desired level" has been changed to "predetermined maximum level," which is described in the specification on page 16, line 7. This term is used as the basis for a comparison to a battery state of charge, which is fully described in the specification. In light of the foregoing, it is submitted that each of the § 112 rejections has been overcome.

Claim Rejections - 35 U.S.C. § 103

The Examiner rejected claims 1-3 as being unpatentable over Pels et al. in view of Field et al. The Examiner states that Pels et al. discloses a method of controlling the idle speed of an engine, and that this method comprises determining whether the vehicle is below a predetermined maximum idle speed and whether an accelerator is below a predetermined minimum pedal position. The Examiner further states that Pels et al. discloses selectively activating an engine controller to control engine idle speed when a predetermined second set of operating conditions is present. The Examiner then states that it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the method of Pels et al. and the step of turning off the engine as disclosed in Field et al.

The MPEP states that in order to establish *prima facie* obviousness, all of the claim limitations of an invention must be taught or suggested by the prior art. (MPEP § 2143.03 8th ed.) The combination of Pels et al. and Field et al. does not teach, or even suggest, all of the claim limitations found in amended claims 1-3. For example, claim 1, as amended, includes the limitations of "selectively activating the vehicle system controller to control the generator to control engine idle when any one of a predetermined first set of operating conditions is present," and "selectively activating the engine controller to control engine idle speed when a predetermined second set of operating conditions is present." It is clear that the method of claim 1 employs two separate controllers—i.e., a vehicle system controller and an engine controller—each of which is used when a separate set of operating conditions is present. No such limitations are taught by Pels et al. or Field et al. Pels et al. does discuss the use of an engine control unit (23) that provides torque settings to a controller (21) for controlling the idle speed of an internal combustion engine. (Col. 6, ll. 22-25). The control unit (23) combines the function of a controller (24) and a set value adjuster (25). (Col. 6, ll. 33-35.) Pels et al., however, does not use two separate controllers to control engine idle when two different sets of operating conditions are present. Claim 1, as amended, claims a method that uses both a "vehicle system controller" to control a generator to control engine idle speed, and an "engine controller" to control engine idle speed when a different set of operating conditions exist. This is a feature that helps to promote one of the results of the

present invention, which is a "perceived tighter speed control feel by having fewer perturbations in engine 24 speed." (Specification page 17, ll. 9-11.) There is nothing in Pels et al. that suggests the use of two separate controllers to be used in two separate sets of operating conditions such as found in amended claim 1.

In addition to Pels et al. failing to teach or suggest certain limitations of the present invention, the combination of Pels et al. with Field et al. fails to teach additional limitations found in amended claim 1. For example, Field et al. discusses turning off the internal combustion engine in a hybrid electric vehicle when the batteries are sensed to be well charged. (Col. 1, ll. 43-46; Col. 6, ll. 38-42.) Field et al. fails to teach "turning off the engine when both the predetermined first set of conditions is not present and the engine has been in a current vehicle idle mode for a predetermined amount of time," as claimed in amended claim 1. Field et al. discusses turning off the engine when one particular criterion has been met—i.e., when the vehicle batteries are well charged. In stark contrast to this, claim 1, as amended, requires that two separate criteria be met before the engine is turned off. Merely turning off an engine when the batteries are well charged, as discussed in Field et al., is not the same as requiring that a predetermined first set of operating conditions not be present and requiring that the engine has been in an idle mode for a predetermined amount of time, as claimed in amended claim 1. Moreover, the focus of Field et al. on the charge level of the battery, fails to suggest the use of other criteria such as whether the vehicle has been in idle mode for a predetermined amount of time, or whether other operating conditions from a set of operating conditions, have been met. Thus, the combination of Pels et al. and Field et al. does not teach or suggest all of the claim limitations found in amended claims 1-3. It is therefore submitted that these claims, as amended, are not obvious in light of the cited references.

The Examiner rejected claims 4-16 as being unpatentable over Pels et al. in view of Field et al., Severinsky, and Kubota et al. The Examiner states that it would have been obvious to modify the combined method of Pels et al. and Field et al. with the control system taught by Severinsky for the purpose of controlling the operating temperature of the engine and the minimum catalyst temperature of the catalytic converter. The Examiner further states that

it would have been obvious to include the control unit for air conditioning and a control system for learning the adapted fuel table as taught by Kubota et al. with the combined Severinsky, Pels et al., Field et al. hybrid vehicle to achieve a temperature selectivity for a vehicle operator and to monitor the current conditions of the driving mode and remaining fuel.

At the outset, it is noted that claims 4-10 and 12-13 depend from claim 1, and therefore, include all of the limitations of that base claim. Each of the dependent claims contains additional limitations that further distinguish it from the prior art. The Examiner does not suggest that Severinsky or Kubota et al. teach the use of two separate controllers for controlling the idle of an engine based on separate sets of operating conditions, nor does the Examiner suggest that Severinsky or Kubota et al. teach the step of turning off an engine when two separate criteria have been met, one of which is based on a first set of operating conditions, and the other based on the vehicle being in idle mode for a predetermined amount of time. Thus, Applicants submit that amended claim 1, and the amended dependent claim 4-10 and 12-13 are not obvious in light of any of the cited references, either alone or in combination.

Claim 11, as amended, claims a hybrid electric vehicle having two different controllers for controlling the idle speed of the engine when two different sets of operating conditions exist. This is analogous to the method claim of amended claim 1, and, as discussed above, none of the prior art teaches or suggests these claim limitations. Similarly, the remaining two independent claims, claim 14 and claim 16, both include limitations of using two separate controllers to control engine idle when two different sets of operating conditions exist. Moreover, like amended claim 1, amended claims 14 and 16 include the limitation of turning off the engine when two separate criteria are met. As discussed above, in regard to amended claims 1 and 11, none of the cited references, either alone or in combination, teach or suggest these limitations. Thus, it is submitted that the amended claim set is not obvious in light of the cited references, and allowance of the amended claims is respectfully requested.

Double Patenting

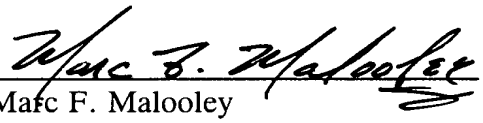
The Examiner provisionally rejected claims 1, 3, 11 and 13-16 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending application No. 09/712,436 (see page 5 of the January 9, 2003 Office Action). The Examiner stated that although the conflicting claims were not identical, they were not patentably distinct from each other.

In a phone interview with Donald Harrington on January 21, 2003, it was confirmed that the serial number of the copending application to which the Examiner referred was incorrect. The correct serial number is 09/848,491. It is the assignee's intention at this time to allow application ser. no. 09/848,491 to go abandoned. Therefore, the double patenting rejection is now moot.

Based on the foregoing, Applicants believe each of the amended claims to be in allowable form, and consideration is respectfully requested.

Respectfully submitted,

Stephen John Kotre et al.

By 

Marc F. Malooley
Reg. No. 50,624
Attorney/Agent for Applicant

Date: March 4, 2003

BROOKS & KUSHMAN P.C.
1000 Town Center, 22nd Floor
Southfield, MI 48075
Phone: 248-358-4400
Fax: 248-358-3351

Attachment

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Specification:

Page 17, Line 2:

The above invention provides a dual method for controlling Engine 24 idle speed in an HEV to accommodate any possible HEV idle situation. The invention uses the Generator Motor 30 coupled to the VSC 46 to control Engine 24 speed for most of the "engine-on" idle modes. As fully described above, operating conditions for which this type of control is used, include steps 130, 150, 170, 190, 210 and 230. These operating conditions may be referred to as a predetermined first set of operating conditions. In alternative situations, such as high battery state of charge or generator failure, the VSC 46 passes control of engine idle speed to the Engine Control Unit 48. These operating conditions may be referred to as a predetermined second set of operating conditions. The invention results in perceived tighter speed control feel by having fewer perturbations in Engine 24 speed.

In The Claims:

1. (Twice Amended) A method for controlling idle speed of an engine in a hybrid electric vehicle, the vehicle including a battery, a generator [that is] operatively coupled to the engine, an engine controller, and a vehicle system controller, the method comprising:

determining whether a set of vehicle idle entry conditions [comprising whether] are met, the idle entry conditions being met when the vehicle speed is below a predetermined [maximum idle speed] value and [whether] an accelerator is below a predetermined minimum pedal position;

selectively activating [a] the vehicle system controller to control the generator to control engine idle speed when any one of a predetermined first set of operating conditions is present;

selectively activating [an] the engine controller to control engine idle speed when a predetermined second set of operating conditions is present; and

turning off the engine when both the predetermined first set of conditions is not present and [when] the engine has been in a current vehicle idle mode for a predetermined amount of time.

2. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the] vehicle system controller is selectively activated to control [the generator to control] engine idle speed when a battery state of charge [of a battery] is below a predetermined [battery] minimum [state of charge] value.

3. (Twice Amended) [A method for controlling idle speed of an engine in a hybrid electric vehicle including a generator that is operatively coupled to the engine and climate control reservoir, the method comprising:

determining whether a first set of vehicle idle entry conditions comprising whether the vehicle is below a predetermined maximum idle speed and whether an accelerator is below a predetermined minimum pedal position;

selectively activating a vehicle system controller to control the generator to control engine idle when a predetermined first set of operating conditions is present;

selectively activating an engine controller to control engine idle speed when a predetermined second set of operating conditions is present;

turning off the engine when the predetermined first set of conditions is not present and when the engine has been in a current vehicle idle mode for a predetermined amount of time; and

selectively activating the vehicle system controller to control the generator to control engine idle when a vacuum level in a climate control reservoir is below a predetermined minimum climate control vacuum level] The method of claim 1, wherein the vehicle further includes a climate control reservoir, and the vehicle system controller is selectively activated to control engine idle speed when a vacuum in the climate control reservoir is below a predetermined minimum level.

4. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the] vehicle further includes a brake system reservoir, and the vehicle system controller is selectively activated to control [the generator to control] engine idle speed when a vacuum [level] in [a] the brake system reservoir is below a predetermined [brake system vacuum] minimum level.

5. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the] vehicle further includes a vapor canister, and the vehicle system controller is selectively activated [to control the generator] to control engine idle speed when [a] the vapor canister [contained within a fuel system] requires purging.

6. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the] vehicle further includes an adaptive fuel table, and the vehicle system controller is selectively activated [to control the generator] to control engine idle speed when [an] the adaptive fuel table requires [HEV-]fast adaptive learning.

7. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the] vehicle system controller is selectively activated [to control the generator] to control engine idle speed [and engine temperature] when the engine has cooled below a predetermined [engine temperature] level.

8. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the] vehicle further comprises a catalyst, and the vehicle system controller is selectively activated to control the [generator to control] engine idle speed when [a] the catalyst has cooled below a predetermined [minimum catalyst temperature] level.

9. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the] vehicle system controller is selectively activated [to control the

generator] to control engine idle speed when air conditioning has been requested by a vehicle operator.

10. (Twice Amended) The method of claim 1, wherein the [step of selectively activating the engine controller to control engine idle speed when:

the generator has failed; or

a battery state of charge exceeds a maximum desired level] vehicle system controller is selectively activated to control engine idle speed when the generator has failed or a battery exceeds a predetermined maximum level.

11. (Twice Amended) A hybrid electric vehicle including a generator having a rotor assembly [which is] operatively coupled to an engine, the hybrid electric vehicle comprising:

a vehicle system controller for controlling idle speed of the engine when [the] a battery state of charge [exceeds a maximum desired level or the generator fails] is below a predetermined level and the generator has not failed; and

an engine controller for controlling the idle speed of the engine when the battery state of charge [is below a predetermined level and no generator failure] exceeds a predetermined maximum level or the generator fails.

12. (Amended) The [hybrid electric vehicle] method of claim [11] 1, wherein [said] the predetermined first set of operating conditions [is selected from a group consisting of] comprises a low battery state of charge, a low climate control vacuum level, a low brake system reservoir vacuum level, a high fuel tank [vapor] pressure, [requiring fuel vapor canister purging, a condition where the fuel vapor canister is currently being purged, a minimum time reached since previously purging the vapor canister, a low engine temperature, a low catalyst temperature, an adaptive fuel table requiring HEV-fast adaptive learning, and an activated] the existence of a minimum time period since a last vapor canister purging, the existence of current vapor canister purging, the existence of a learned adaptive fuel table for the current driving mode, a low engine temperature, a low catalyst temperature, and the state of activation of an air conditioning switch.

13. (Twice Amended) The [hybrid electric vehicle] method of claim [11] 1, wherein the predetermined second set of operating conditions [is selected from a group consisting of] comprises a high battery state of charge and a failed generator.

14. (Twice Amended) A method for controlling idle speed of an engine in a hybrid electric vehicle [having], the vehicle including a battery, a generator [that is] operatively coupled to the engine, an engine controller, and a vehicle system controller, the method comprising:

determining whether a set of vehicle idle entry conditions [comprising whether] are met, the idle entry conditions being met when the vehicle speed is below a predetermined [maximum idle speed] value and [whether] an accelerator pedal is below a predetermined minimum pedal position;

selectively activating [a] the vehicle system controller to control the generator to control engine idle speed when [a first set of operating conditions comprising: a low battery

state of charge, a low climate control vacuum level, a low brake system reservoir vacuum level, a high fuel tank pressure, the existence of a minimum time period since a last vapor canister purging, the existence of current vapor canister purging, the existence of a learned adaptive fuel table for the current driving mode, a low engine temperature, a low catalyst temperature, and the state of activation of an air conditioning switch] any one of a predetermined first set of operating conditions is present, the first set of operating conditions including a low battery state of charge, a low climate control vacuum level, a low brake system reservoir vacuum lever, a high fuel tank pressure, the existence of a minimum time period since a last vapor canister purging, the existence of current vapor canister purging, the existence of a learned adaptive fuel table for the current driving mode, a low engine temperature, a low catalyst temperature, and the state of activation of an air conditioning switch;

selectively activating [an] the engine controller to control engine idle speed when a predetermined second set of operating conditions is present; and

turning off the engine when both the predetermined first set of [operating] conditions is not present and [when] the engine has been in a current vehicle idle mode for a predetermined amount of time[, otherwise maintaining the current vehicle idle mode].

15. (Twice Amended) [A method for controlling idle speed of an engine in a hybrid electric vehicle having a generator that is operatively coupled to the engine, the method comprising:

determining whether a set of vehicle idle entry conditions comprising whether the vehicle is below a predetermined maximum idle speed and whether an accelerator is below a predetermined minimum pedal position are met;

selectively activating a vehicle system controller to control the generator and producing a first desired effect when a first set of operating conditions exist;

selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present;

turning off the engine when the first set of operating conditions is not present and when the engine has been in a current vehicle idle mode for a predetermined amount of time, otherwise maintaining the current vehicle idle mode; and

selectively activating the engine controller to control engine idle speed when the generator has failed] The method of claim 14, wherein the predetermined second set of operating conditions comprises a high battery state of charge and a failed generator.

16. (Twice Amended) A method for controlling idle speed of an engine in a hybrid electric vehicle [having], the vehicle including a battery, a generator [that is] operatively coupled to the engine, an engine controller, and a vehicle system controller, the method comprising:

determining whether a set of vehicle idle entry conditions [comprising whether] are met, the idle entry conditions being met when the vehicle speed is below a predetermined [maximum idle speed] value and [whether] an accelerator pedal is below a predetermined minimum pedal position [are met];

selectively activating [a] the vehicle system controller to control the generator to control engine idle speed when any one of a predetermined [a] first set of operating conditions [exist] is present;

selectively activating [an] the engine controller to control engine idle speed when a predetermined second set of operating conditions is present, the predetermined second set of operating conditions including a high battery state of charge and a failed generator; and

turning off the engine when both the predetermined first set of [operating] conditions is not present and [when] the engine has been in a current vehicle idle mode for a predetermined amount of time[, otherwise maintaining the current vehicle idle mode; and

selectively activating the engine controller to control engine idle speed when a battery state of charge exceeds a maximum desired level].